

## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

1 | 1. (Currently amended) A method for detecting violations of type casting  
2 | rules in a computer program, comprising:  
3 | receiving the computer program prior to compilation and execution,  
4 | wherein the computer program is received in source code form, ~~and wherein the~~  
5 | ~~method further comprises parsing the computer program into an intermediate form~~  
6 | ~~prior to locating a type casting operation;~~  
7 | locating the explicit type casting operation within the computer program,  
8 | wherein the explicit type casting operation involves a first pointer and a second  
9 | pointer;  
10 | checking the explicit type casting operation for a violation of a type  
11 | casting rule; and  
12 | if a violation is detected, indicating the type-casting violation.

1 | 2. (Currently amended) The method of claim 1, wherein checking the  
2 | explicit type casting operation involves determining if the first pointer is defined  
3 | to be a structure pointer and the second pointer is not defined to be a structure  
4 | pointer, and if so, indicating a violation if no char exception applies.

1 | 3. (Currently amended) The method of claim 2, wherein indicating the  
2 | type-casting violation involves:

3           generating a warning to warn a programmer of a potential type violation if  
4   the second pointer is a void or char pointer; and  
5   |       generating an error to indicate a type casting violation to the programmer  
6   if the second pointer is a pointer to a scalar.

1           4. (Original) The method of claim 1, wherein if the first pointer is defined  
2   to point to a first structure type and the second pointer is defined to point to a  
3   second structure type, the method further comprises:  
4       determining whether the first structure type and the second structure type  
5   belong to the same alias group; and  
6       if the first structure type and the second structure type do not belong to the  
7   same alias group, generating an error to indicate a type violation.

1           5. (Original) The method of claim 4, wherein determining whether the first  
2   structure type and the second structure type belong to the same alias group  
3   involves:  
4       keeping track of special program statements that link structure types into  
5   alias groups;  
6       determining that the first structure type and the second structure type  
7   belong to the same alias group if the first structure type and the second structure  
8   type are the same structure type, or if one or more special procedures link the first  
9   structure type and the second structure type into the same alias group.

1           6. (Original) The method of claim 5, further comprising determining that  
2   the first structure type and the second structure type belong to the same alias  
3   group if the first structure type and the second structure type have all the same  
4   basic types in the same order.

1           7 (Canceled).

1           8. (Original) The method of claim 1, further comprising:  
2           receiving an identifier for a set of constraints on memory references that a  
3           programmer has adhered to in writing the computer program; and  
4           using the identifier to select a type casting rule from a set of type casting  
5           rules, the selected type casting rule being associated with the set of constraints;  
6           wherein each type casting rule in the set of type casting rules is associated  
7           with a different set of constraints on memory references.

1           9. (Original) The method of claim 1, wherein the method is performed by a  
2           compiler.

1           10. (Original) The method of claim 1, wherein the method is performed by  
2           an error checking application, which is not part of a compiler.

1           11. (Currently amended) A computer-readable storage medium storing  
2           instructions that when executed by a computer cause the computer to perform a  
3           method for detecting violations of type casting rules in a computer program, the  
4           method comprising:  
5           receiving the computer program prior to compilation and execution,  
6           wherein the computer program is received in source code form, ~~and wherein the~~  
7           ~~method further comprises parsing the computer program into an intermediate form~~  
8           ~~prior to locating a type casting operation;~~  
9           locating the explicit type casting operation within the computer program,  
10          wherein the explicit type casting operation involves a first pointer and a second  
11          pointer;

12 | checking the explicit type casting operation for a violation of a type  
13 | casting rule; and  
14 | if a violation is detected, indicating the type-casting violation.

1 | 12. (Currently amended) The computer-readable storage medium of claim  
2 | 11, wherein checking the explicit type casting operation involves determining if  
3 | the first pointer is defined to be a structure pointer and the second pointer is not  
4 | defined to be a structure pointer, and if so, indicating a violation if no char  
5 | exception applies.

1 | 13. (Currently amended) The computer-readable storage medium of claim  
2 | 12, wherein indicating the type-casting violation involves:  
3 | generating a warning to warn a programmer of a potential type violation if  
4 | the second pointer is a void or char pointer; and  
5 | generating an error to indicate a type casting violation to the programmer  
6 | if the second pointer is a pointer to a scalar.

1 | 14. (Original) The computer-readable storage medium of claim 11,  
2 | wherein if the first pointer is defined to point to a first structure type and the  
3 | second pointer is defined to point to a second structure type, the method further  
4 | comprises:  
5 | determining whether the first structure type and the second structure type  
6 | belong to the same alias group; and  
7 | if the first structure type and the second structure type do not belong to the  
8 | same alias group, generating an error to indicate a type violation.

1           15. (Original) The computer-readable storage medium of claim 14,  
2 wherein determining whether the first structure type and the second structure type  
3 belong to the same alias group involves:  
4           keeping track of special program statements that link structure types into  
5 alias groups;  
6           determining that the first structure type and the second structure type  
7 belong to the same alias group if the first structure type and the second structure  
8 type are the same structure type, or if one or more special procedures link the first  
9 structure type and the second structure type into the same alias group.

1           16. (Original) The computer-readable storage medium of claim 15,  
2 wherein the method further comprises determining that the first structure type and  
3 the second structure type belong to the same alias group if the first structure type  
4 and the second structure type have all the same basic types in the same order.

1           17 (Canceled).

1           18. (Original) The computer-readable storage medium of claim 11,  
2 wherein the method further comprises:  
3           receiving an identifier for a set of constraints on memory references that a  
4 programmer has adhered to in writing the computer program; and  
5           using the identifier to select a type casting rule from a set of type casting  
6 rules, the selected type casting rule being associated with the set of constraints;  
7           wherein each type casting rule in the set of type casting rules is associated  
8 with a different set of constraints on memory references.

1           19. (Original) The computer-readable storage medium of claim 11,  
2 wherein the method is performed by a compiler.

1           20. (Original) The computer-readable storage medium of claim 11,  
2 wherein the method is performed by an error checking application, which is not  
3 part of a compiler.

1           21. (Currently amended) An apparatus that detects violations of type  
2 casting rules in a computer program, comprising:  
3           a receiving mechanism that is configured to receive the computer program  
4 prior to compilation and execution;  
5           wherein the receiving mechanism is configured to receive the computer  
6 program in source code form; and  
7           ~~wherein the apparatus further comprises a parsing mechanism that is~~  
8 ~~configured to parse the computer program into an intermediate form prior to~~  
9 ~~locating a type casting operation~~  
10           a locating mechanism that is configured to locate the explicit type casting  
11 operation within the computer program, wherein the explicit type casting  
12 operation involves a first pointer and a second pointer; and  
13           a type rule checking mechanism that is configured check the explicit type  
14 casting operation for a violation of a type casting rule, and if a violation is  
15 detected, to indicate the type-casting violation.

1           22. (Previously presented) The apparatus of claim 21, wherein the type  
2 rule checking mechanism is configured to determine if the first pointer is defined  
3 to be a structure pointer and the second pointer is not defined to be a structure  
4 pointer, and if so, to indicate a violation if no char exception applies.

1           23. (Currently amended) The apparatus of claim 22, wherein the type  
2 casting rule checking mechanism is configured to:

3           generate a warning to warn a programmer of a potential type violation if  
4   the second pointer is a void or char pointer; and to  
5           generate an error to indicate a type-casting violation to the programmer if  
6   the second pointer is a pointer to a scalar.

1           24. (Original) The apparatus of claim 21, wherein if the first pointer is  
2   defined to point to a first structure type and the second pointer is defined to point  
3   to a second structure type, the type rule checking mechanism is configured to:  
4           determine whether the first structure type and the second structure type  
5   belong to the same alias group; and to  
6           generate an error to indicate a type violation if the first structure type and  
7   the second structure type do not belong to the same alias group.

1           25. (Original) The apparatus of claim 24, wherein in determining whether  
2   the first structure type and the second structure type belong to the same alias  
3   group, the type rule checking mechanism is configured:  
4           keep track of special program statements that link structure types into alias  
5   groups; and to  
6           determine that the first structure type and the second structure type belong  
7   to the same alias group if the first structure type and the second structure type are  
8   the same structure type, or if one or more special procedures link the first structure  
9   type and the second structure type into the same alias group.

1           26. (Original) The apparatus of claim 25, wherein the type rule checking  
2   mechanism is configured to determine that the first structure type and the second  
3   structure type belong to the same alias group if the first structure type and the  
4   second structure type have all the same basic types in the same order.

1           27 (Canceled).

1           28. (Original) The apparatus of claim 21, wherein the receiving  
2 mechanism is configured to receive an identifier for a set of constraints on  
3 memory references that a programmer has adhered to in writing the computer  
4 program, and further comprising:  
5           a selection mechanism that is configured to use the identifier to select a  
6 type casting rule from a set of type casting rules, the selected type casting rule  
7 being associated with the set of constraints;  
8           wherein each type casting rule in the set of type casting rules is associated  
9 with a different set of constraints on memory references.

1           29. (Original) The apparatus of claim 21, further comprising a compiler  
2 that contains the receiving mechanism, the locating mechanism and the type rule  
3 checking mechanism.

1           30. (Original) The apparatus of claim 21, further comprising an error  
2 checking application, which is not part of a compiler;  
3           wherein the error checking application contains the receiving mechanism,  
4 the locating mechanism and the type rule checking mechanism.